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the heath[6] was the first of an ecological series on the formations of central Europe, so Drude's contribution is the first of a floristic series in the same region. The most striking feature of the present volume is its marvelous detail. Exact facts are presented as to the distribution of all of the higher plants, and many of the lower plants. An opportunity is thus given for drawing conclusions as to distribution with almost mathematical certainty. After the usual presentation of historical and geological data, a detailed account is made of the thirty formations of the Hercynic region, placed in ten groups. The body of the work is taken up with a minute discussion of the fifteen subdivisions, into which Drude splits this area. It is here that the individuality and value of this work is best realized; one may well admire the spirit which has prompted the years of exact and careful study making such a volume possible. The closing section treats the relation between the Hercynic and neighboring floras, and the glacial and postglacial history of the Hercynic flora. Not only an abundance of glacial relicts but some interglacial relicts are reported. While the book is scarcely one to be read by one who is unfamiliar with the region, it must be of unspeakable value to German plant geographers. Moreover, all will welcome a volume upon which so much care and pains have been taken to secure an accurate presentation of floristic data.—H. C. COWLES.

MINOR NOTICES.

THREE ADDITIONAL NUMBERS of Karsten and Schenck's *Vegetationsbilder*[7] have recently appeared. Schenck has prepared the third number, dealing with economic plants from the tropics: Thea, Theobroma, Coffea, Myristica, and Carica. The fourth number by Karsten portrays the tropical and subtropical rainy forests of Mexico. The fifth number is issued by Schenck, and consists of pictures from southwestern Africa; a desert with Welwitschia, a euphorbia steppe, a shrub steppe, *Aloe dichotoma*, acacias along a dry stream bed, Euclea. As stated in the former review,[8] these illustrations are accompanied by full descriptions, and set forth most admirably the vegetation features of far distant lands.—H. C. COWLES.

NOTES FOR STUDENTS.

PAMPALONI[9] records two species of fungi from the middle Miocene of Sicily, referring them to the genera *Uncinulites* and *Erysiphites*. They are reconsidered by Salmon,[10] the well known authority on these plants, who considers that *Erysiphites* is not related to the modern Erysiphaceae and that *Uncinulites* should be considered as a species of *Cercosporites*.—E. W. BERRY.

[6] See BOT. GAZ. 35: 293. 1903.

[7] KARSTEN, G., and SCHENCK, H., Vegetationsbilder. Hefts 3, 4, 5. *pls. 13–30.* Jena: Gustav Fischer. 1903.

[8] BOT. GAZ. 35: 294. 1903.

[9] PAMPALONI, L., Rendiconti della R. Accad. dei Lincei 11: 250–251. 1902.

[10] SALMON, E. S., Journ. Botany 41: 127–130. 1903.

BECK has given us his views respecting the delimitation of plant formations.[11] He discusses the varied use of the term formation, the relations between floristic and biological conceptions, and other disputed questions. Beck believes that true formations are rather sharply marked, and that many "transitions" are developmental stages or are due to man's influence.—H. C. COWLES.

C. C. ADAMS[12] has discussed in an interesting manner the postglacial origin and migration of the life of the northeastern United States. It is shown, especially from his studies of shells, that the southeastern United States is the greatest of the life centers; the southwest has been a secondary center. The Mississippi valley and the coastal plain have been prominent paths of migration.—H. C. COWLES.

R. E. B. MCKENNEY[13] has published some notes on plant distribution in Orange county, southern California. He describes seven formations; the mountains with hard-leaved evergreen shrubs; the foothills, also dominated by a scrubby growth; the cañons, which alone have trees, the river beds, mesas, bogs, and strand. He regards this flora as not properly sclerophyll, but intermediate between this type and the desert.—H. C. COWLES.

MÖLLER,[14] a pupil of Nathorst, has published a flora of the Upper Jurrassic of Bornholm. Contrasted with more southerly localities in Europe, it is distinguished by the presence of a member of the Marattiaceae which at that time are no longer represented to the southward. Several members of the Dipteridinae are also recorded. The Matonieae are represented by specimens scarcely distinguishable from the existing *Matonia pectinata*. Numerous Cycadean leaves are present as are also members of the Ginkgoales.—E. W. BERRY.

J. W. BLANKINSHIP[15] gives a list of the plant formations of eastern Massachusetts with their character plants. His classification is as follows: Xerophytes (sand barrens, hilltop barrens), Mesophytes (sand plain forests, hilly upland forests), Hygrophytes (sand pond margins, low meadows, seashores, low woodlands), Helophytes (swamps, bogs, salt marshes, boggy woodlands), Hydrophytes (sand ponds, mud ponds, sea shoals, fresh-water formations, pelagic formations), Biophytes (waste lands, economic formations, fungoid formations).—H. C. COWLES.

[11] BECK, VON MANNAGETTA, G. RITTER, Ueber die Umgrenzung der Pflanzenformationen. Oesterr. Bot. Zeit. **52**: 421–427. 1902.

[12] Jour. Geog. **1**: 303–310; 352–357. 1902.

[13] MCKENNEY, R. E. B., Notes on plant distribution in southern California. U. S. A. Beihefte Bot. Centralbl. **10**: 166–178. 1901.

[14] MÖLLER, HJALMAR, Bidrag till Bernholms fossile Flora, Kongl. Fysiog. Sällsk. Handl. Lund **13**: ——. 1902.

[15] BLANKINSHIP, J. W., The plant formations of eastern Massachusetts. Rhodora **5**: 124–137. 1903.

RAUNKIÆR announces[16] that the dandelions in Denmark are parthenogenetic. He finds varations in the common species, on which he bases five new species, besides recognizing two others previously segregated. All these produce fruit freely without fertilization, and even when the flowers of an unopened head are so far sliced off that no stigmas or anthers remain. *Taraxacum obovatum* (Willd.) DC. of southern Europe, *T. glaucanthum* (Ledeb.) DC. from Pamir, and *T. croceum* Dahls, from Greenland and Norway produced fruit without fecundation. Though the author made no cytological study of the case, he searched in vain for germinating pollen or pollen tubes.—C. R. B.

DR. WILLIAM G. SMITH, who has taken up the work of the late Robert Smith,[17] has published the first of a projected series of papers on the distribution of British plants,[18] entitled "Geographical distribution of vegetation in Yorkshire." The methods of Flahault, as applied in Scotland by Robert Smith, have here been employed for the first time in England, and with high success. A map, worked out in extreme detail, forms the basis for the discussion in the text. The moorlands form the most natural vegetation of the district, and are developed as moss moors with much cotton grass, or heather moors with Calluna. The woodlands are dominated by oaks. Much the greater part of the area is cultivated or otherwise modified by man. Nine photographic reproductions of plant associations are inserted in the text. In this connection it may be noted that Dr. Smith has given us an admirable critical review of Graebner's recent studies on the North German heath, comparing the conditions of heath development in Germany and England.[19] — H. C. COWLES.

CASES OF regeneration in the strict sense are of such rarity or of such dubious character among plants as to lead to controversy whether it occurs at all. Pischinger[20] has noted two instances of regeneration in *Streptocarpus Wendlandi* Damm. (Gesneriaceae) which must be conceded to be of the same type as that found in animals. This remarkable plant normally produces no distinct epicotyl and no foliage leaves, but a meristem region develops near the base of the larger cotyledon, which then grows to a foliar structure about $40 \times 20^{\mathrm{cm}}$. From near the base of this structure arises the scape bearing the inflorescence. In a series of experiments in which a part or all of this leaf-like organ was removed, the entire structure was in two instances regenerated at the surface from which the original had been cut.

[16] RAUNKIÆR, C., Kimdannelse uden Befrugtning hos Mælkebötte. Bot. Tidsskrift **25**: 109–140. 1903.

[17] See BOT. GAZ. **31**: 136. 1901.

[18] SMITH, W. G., Geog. Jour. **21**: 375–401. 1903.

[19] Scot. Geog. Mag. **18**: 587–597. 1902.

[20] PISCHINGER, FERDINAND, Ueber Bau und Regeneration des Assimilationsapparates von Streptocarpus und Monophyllaea. Sitz. Ber. Wiener Acad. **111**: 278–302. *pls. 2*. 1902.

In many cases the "leaf" was regenerated when only a part was removed, but this differs from strict regeneration in that it is development of an organ from an already existent meristem. Studies upon other species of Streptocarpus and upon the nearly related Monophyllaea, which normally produce true foliage leaves, showed many instances of this kind of "regeneration," as well as numerous cases of regeneration in the wider sense of correlated development of other structures.—G. H. SHULL.

THE FIRST account of nuclear conditions in the sexual organs of the Gymnoasceae is presented[21] by Miss E. Dale, who has studied especially *Gymnoascus Reesii* and *G. candidus* (*Arachniotus candidus*). Miss Dale establishes beyond question the presence of a sexual process, supporting in the main the earliest account of this group by Baranetzky in 1872, and discrediting the later views of van Tieghem, Zukal, and Brefeld, who have denied the existence of sexuality.

The sexual organs of *Gymnoascus Reesii* arise as two lateral branches on each side of a septum. They grow out at right angles to the parent hypha and twist around each other, their free ends becoming swollen and finally cut off by a cross wall from the stalks below. These two cells generally fuse while there is yet little differentiation between them, but soon one develops a process that coils around the other, which remains straight and finally becomes spherical. The coiled cell divides by cross walls and from most of the segments one or two short thick branches arise as ascogenous hyphae whose ends develop into asci.

Both sexual cells at the time of fusion contain large numbers of nuclei, and are therefore coenogametes, but when first formed there is only one nucleus in each cell. This nucleus probably divides to give the later multinucleate condition, but Miss Dale did not follow this process, nor did she determine with certainty whether the nuclei unite in pairs after the fusion of the coenogametes. The nuclei pass into the coiled prolongation, and thence into the ascogenous hyphae. The nuclear history during the development of the ascospores was not studied in detail. In *Gymnoascus candidus* the two coenogametes may not arise from the same hypha or simultaneously as in *G. Reesii*, but otherwise the two forms agree in all essentials.

These studies add another type to the rapidly growing list of lowly Ascomycetes whose sexual organs are coenogametes, and indicate that this condition is likely to prove very general in the group. The possible bearing of this on the problems of the origin and relationships of the Ascomycetes is of great interest in connection with the conditions prevalent in the Mucorales, Saprolegniales, and Peronosporales—a subject which the reviewer has recently considered in his paper on "Oogenesis in Saprolegnia."[22]—B. M. DAVIS.

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[21] DALE, ELIZABETH, Observations on Gymnoasceae. Ann. Botany **17**: 571–596. *pls. 27, 28.* 1903.

[22] BOT. GAZ. **35**: 233. 1903.